Appl. No. 10/027,667
Atty. Docket No. 8828L$
Amendment dated 7/27/2006
Reply to Office Action of 5/09/2006
Customer No. 27752

REMARKS

Claim Status

Claims 1 and 32 have been amended. Claim 94 has been added. Claims 1-29, 31-32, 41 and 94 are now pending. Applicant reserves the right to pursue the original claims in this and other applications. The Title of the Invention has been amended to correspond more closely to the pending claims. Applicant respectfully requests reconsideration of the above-referenced application in light of the amendments and following remarks.

Claim Amendments and Addition Support

Independent claim 1 has been amended to recite an apparatus comprising, *inter alia*, "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a direct current power supply *having less than about 2.7 watts of power*." (emphasis added). Support for the claim amendment is found in Applicant's specification, at least on p. 8, l. 31 – p. 15, l. 26.

Independent claim 32 has been amended to recite an apparatus comprising, *inter alia*, "at least one non-membrane electrolytic cell further comprising: an anode with a surface area of less than about 30 cm^2; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-membrane electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a current power supply . . . [which] *has less than about 2.7 watts of power*." (emphasis added). Support for the claim amendment is found in Applicant's specification, at least on p. 8, l. 31 – p. 15, l. 26.

New independent claim 94 has been added. Claim 15 recites an electrolysis apparatus comprising, *inter alia*, "at least one cell chamber; at least one electrolytic cell with at least one anode and at least one cathode, wherein at least one pair of an anode and

a cathode is separated by a porous barrier; a reservoir connected to said at least one electrolytic cell by a passage; at least one pump connected to said reservoir and passage; and at least one battery connected to said at least one anode and said at least one cathode." Support for the claim amendment is found in Applicant's specification, at least on p. 8, l. 31 – p. 15, l. 26.

Rejection Under 35 U.S.C. § 112, Second Paragraph

The Office Action indicates that claim 41 stands rejected under 35 U.S.C. § 112, Second Paragraph, for insufficient antecedent basis. The rejection is respectfully traversed. Claim 41 has been amended to obviate the Examiner's concerns. Specifically, claim 41 now recites, *inter alia*, that the "electrolytic cell converts the oxidation state of inorganic species to a state that is removable by *a* filter." (emphasis added). The Examiner's approval is respectfully solicited, and the 35 U.S.C. § 112, Second Paragraph, rejection should be withdrawn.

Rejection Under 35 U.S.C. § 103(a)

Claims 1, 3, 4, 22, 23 and 32 stand rejected to under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,306,281 ("Kelley") in view of U.S. Patent No. 4,414,070 ("Spence"). The rejection is respectfully traversed.

Applicant respectfully directs the Examiner's attention to the "Amendments" section of the instant paper, in which Applicant has amended independent claims 1 and 32, to particularly point out and distinctly claim the subject matter that the Applicant regards as his invention. Support for the present amendment is found throughout the specification and claims, as originally-filed. No new matter has been introduced.

As such, Applicant respectfully submits that the cited references do not disclose or suggest an apparatus comprising, *inter alia*, "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said

passage . . . and a direct current power supply *having less than about 2.7 watts of power.*" (emphasis added).

Similarly, the cited references do not disclose or teach an apparatus comprising, *inter alia*, "at least one non-membrane electrolytic cell further comprising: an anode with a surface area of less than about 30 cm^2; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-membrane electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a current power supply . . . [which] *has less than about 2.7 watts of power.*" (emphasis added).

Neither Kelley nor Spence, alone or in combination, teach or disclose "a passage connecting said anode and cathode *adjacent to the anode of* [a] a non-barrier electrolytic cell", as recited in claim 1 (emphasis added), or "a passage connecting said anode and cathode *adjacent to the anode of* a non-membrane electrolytic cell," as recited in claim 32 (emphasis added), or "an anode with *a surface area of less than about 30 cm^2*," as recited in claim 32 (emphasis added).

Kelley and Spence are completely silent about surface area. The cited references must teach *or* suggest *all* claim limitations for a proper rejection under 35 U.S.C. § 103(a).

Moreover, Kelley requires the addition of a buffering agent and/or an acid to the aqueous chlorite solution in an amount sufficient to control the pH of the chlorine dioxide solution at a pH of about 9.5 or below upon electrolysis. *See* Kelley; Claim 1. Due to the high concentration of buffer required for stabilization according to Kelley, it is believed that Kelley's process and system requires higher power requirements; and thus, is not suitable for battery performance (i.e., 6 Volts, 5 Amps, in a DC System). In contrast, Applicant's claimed system may be configured for operation via a battery or set of batteries – including those having a nominal voltage potential of 1.5 volts, 3 volts, 4.5 volts and 6 volts (Applicant's specification, p. 17). In other words, Kelley does not disclose much less suggest "a direct current power supply *having less than about 2.7*

watts of power," as recited in claim 1 (emphasis added).

Spence is relied upon for disclosing that the efficiency of electrolytic cells is dependent on the anode-cathode distance, and adds nothing to rectify the deficiencies associated with Kelley. The Office Action asserts it would have been obvious to routinely optimize the gap between the anode and cathode to achieve a minimized spacing such as less than 0.6 mm to improve cell efficiency. Applicant respectfully disagrees. There is no motivation to combine the cited references.

To accommodate the buffer concentration of the aqueous solution disclosed by Kelley (i.e., 10,000 parts per million), it is believed that a large cell chamber gap size would be required rather than a smaller one. The present invention relates to electrolysis cells having a cell chamber gap size of less than 0.6 millimeters, more preferably 0.2 millimeters, or less (Applicant's specification, p. 9, ll. 10-11). The only motivation to combine the references is gleaned from Applicant's specification. As such, Kelley and Spence, even if properly combinable which they are not, still would not teach or suggest that "a distance between said anode and said cathode of less than about 0.6 mm," as recited in independent claims 1 and 32.

Claims 3, 4, 22, and 23 depend from claim 1 and should be similarly allowable with claim 1 for at least the reasons provided above with regard to claim 1, and on their own merits. Consequently, the § 103(a) rejection of claims 1, 3, 4, 22, 23 and 32 should be withdrawn.

Rejection Under 35 U.S.C. § 103(a)

Claims 1-4, 22-24, 29, 31 and 32 stand rejected to under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,261,464 ("Herrington") in view of Spence. The rejection is respectfully traversed.

Applicant respectfully submits that the cited references do not disclose or suggest an apparatus comprising, *inter alia,* "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between

said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a direct current power supply *having less than about 2.7 watts of power.*" (emphasis added).

Similarly, the cited references do not disclose or teach an apparatus comprising, *inter alia*, "at least one non-membrane electrolytic cell further comprising: an anode with a surface area of less than about 30 cm^2; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-membrane electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a current power supply . . . [which] *has less than about 2.7 watts of power.*" (emphasis added).

Neither Herrington nor Spence, alone or in combination, teach or disclose "a passage connecting said anode and cathode *adjacent to the anode of* [a] a non-barrier electrolytic cell", as recited in claim 1 (emphasis added), or "a passage connecting said anode and cathode *adjacent to the anode of* a non-membrane electrolytic cell," as recited in claim 32 (emphasis added), or "an anode with *a surface area of less than about 30 cm^2*," as recited in claim 32 (emphasis added).

Herrington and Spence are completely silent about surface area. The cited references must teach *or* suggest *all* claim limitations for a proper rejection under 35 U.S.C. § 103(a).

Spence is relied upon for disclosing that the efficiency of electrolytic cells is dependent on the anode-cathode distance, and adds nothing to rectify the deficiencies associated with Herrington. The Office Action asserts it would have been obvious to routinely optimize the gap between the anode and cathode to achieve a minimized spacing such as less than 0.6 mm to improve cell efficiency. Applicant respectfully disagrees. There is no motivation to combine the cited references.

To accommodate the buffer concentration of the aqueous solution disclosed by Herrington, it is believed that a large cell chamber gap size would be required rather than a smaller one. The present invention relates to electrolysis cells having a cell chamber gap size of less than 0.6 millimeters, more preferably 0.2 millimeters, or less (Applicant's specification, p. 9, ll. 10-11). The only motivation to combine the references is gleaned from Applicant's specification. As such, Herrington and Spence, even if properly combinable which they are not, still would not teach or suggest that "a distance between said anode and said cathode of less than about 0.6 mm," as recited in independent claims 1 and 32.

Claims 2-4, 22-24, 29, 31 depend from claim 1 and should be similarly allowable with claim 1 for at least the reasons provided above with regard to claim 1, and on their own merits. Consequently, the § 103(a) rejection of claims 1-4, 22-24, 29, 31 and 32 should be withdrawn.

Rejection Under 35 U.S.C. § 103(a)

Claims 5-21 and 41 stand rejected to under 35 U.S.C. § 103(a) as being unpatentable over Herrington in view of Spence, and further in view of U.S. Patent Application No. 2002/0157966 ("Weakly"). The rejection is respectfully traversed.

Claims 5-21 depend from claim 1 and should be similarly allowable with claim 1 for at least the reasons provided above with regard to claim 1, and on their own merits. Claim 41 depends from claim 32 and should be similarly allowable with claim 32 for at least the reasons provided above with regard to claim 32, and on its own merits.

For instance, the cited references do not disclose or suggest an apparatus comprising, *inter alia,* "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a direct current power supply *having less than about 2.7 watts of power.*" (emphasis added).

Similarly, the cited references do not disclose or teach an apparatus comprising, *inter alia*, "at least one non-membrane electrolytic cell further comprising: an anode with a surface area of less than about 30 cm^2; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-membrane electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a current power supply . . . [which] *has less than about 2.7 watts of power.*" (emphasis added).

Consequently, the § 103(a) rejection of claims 5-21 and 41 should be withdrawn.

Rejection Under 35 U.S.C. § 103(a)

Claims 25 and 26 stand rejected to under 35 U.S.C. § 103(a) as being unpatentable over Herrington in view of Spence, and further in view of U.S. Patent No. 3,632,498 ("Beer"). The rejection is respectfully traversed.

Claims 25-26 depend from claim 1 and should be similarly allowable with claim 1 for at least the reasons provided above with regard to claim 1, and on their own merits. Specifically, the cited references do not disclose or suggest an apparatus comprising, *inter alia*, "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a direct current power supply *having less than about 2.7 watts of power.*" (emphasis added). Consequently, the § 103(a) rejection of claims 25-26 should be withdrawn.

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Rejection Under 35 U.S.C. § 103(a)

Claims 27 and 28 stand rejected to under 35 U.S.C. § 103(a) as being unpatentable over Herrington in view of Spence, and further in view of U.S. Patent No. 5,937,641 ("Graham"). The rejection is respectfully traversed.

Claims 27-28 depend from claim 1 and should be similarly allowable with claim 1 for at least the reasons provided above with regard to claim 1, and on their own merits. Specifically, the cited references do not disclose or suggest an apparatus comprising, *inter alia,* "at least one non-barrier electrolytic cell further comprising: an anode; a cathode, and *a passage connecting said anode and cathode adjacent to the anode of said non-barrier electrolytic cell* . . . having a distance between said anode and said cathode of less than about 0.6 mm; an inlet port in fluid communication with said passage . . . and an outlet port in fluid communication with said passage . . . and a direct current power supply *having less than about 2.7 watts of power.*" (emphasis added). Consequently, the § 103(a) rejection of claims 27 and 28 should be withdrawn.

Applicant has made an earnest effort to place their application in proper form and to distinguish the invention as now claimed from the applied references. All matters raised by the Office Action are believed to be addressed by the remarks made hereunder. The claims have been amended in accordance with the law. In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to review and pass this application to issue. In view of the foregoing, Applicant respectfully requests

reconsideration of this application, entry of the amendments presented herein, and allowance of the pending claims.

Respectfully submitted,

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